

Ultra-Lightweight Nanocomposite Foams and Sandwich Structures for Space Structures Applications, Phase II

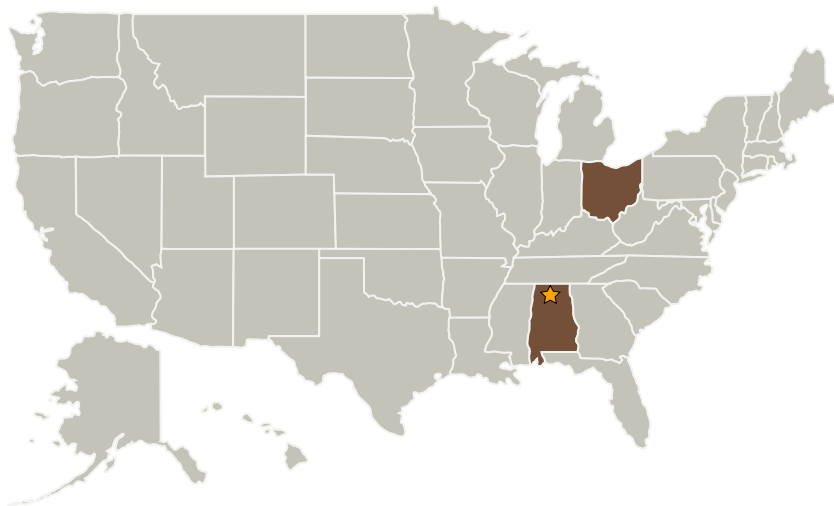
Completed Technology Project (2007 - 2009)



Project Introduction

Space structures that are ultra-lightweight, and have gas barrier property, space durability, radiation resistance, EMI shielding, and high impact resistance are desirable to improve the reliability and provide a safe resting environment for astronauts and electronic equipment housing and protection. Some of the components currently in use such as stations or habitats use double-wall thick films with high internal pressure. Electronic housings made of metals are heavy and need improved EMC protection. Some components are in thin film form and the specific rigidity and dimensional stability needs improvement. Components of landers and vehicles are subject to dust impact. All these solid or hollow components are vulnerable in space because of the foreign object impact or radiation attack. In the Phase I project, we have successfully developed lightweight, microcellular nanocomposite foams and sandwich structures that possess all the desirable properties mentioned above. The nanocomposite sandwich structures have excellent compression-after-impact properties. Phase II project will optimize and scale up the proposed materials and structures for structural components fabrication. The proposed microcellular nanocomposite foam and sandwich structures do not involve or release any toxicity and will have high specific mechanical properties. We will team up with Orbital Sciences Corp. to develop a prototype electronic housing for MACH3 space structure applications.

Primary U.S. Work Locations and Key Partners



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| Organizations Performing Work | Role | Type | Location |
|---------------------------------------|-------------------------|-------------|---------------------|
| ★ Marshall Space Flight Center (MSFC) | Lead Organization | NASA Center | Huntsville, Alabama |
| Wright Materials Research Co. | Supporting Organization | Industry | Beavercreek, Ohio |

| Primary U.S. Work Locations | |
|-----------------------------|------|
| Alabama | Ohio |

Project Transitions

 **December 2007:** Project Start

 **November 2009:** Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.1 Lightweight Structural Materials